



## Competition Agreement

For the 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016)

Between

Team «Team»

Represented by team leader Mr. «team leader\_last name», «team leader\_surname»

«Street»

«Postal code» «city»

– Hereinafter called «Team»–

And

the Chair of Thermodynamics  
(Prof. Dr.-Ing. Thomas Sattelmayer)  
Boltzmannstraße 15  
85747 Garching

(acting on behalf of the president of Technical University of Munich)

– Hereinafter called TUM –

The following agreement describes the terms and conditions for participation in the  
2016 TUM DeSal Challenge:

(German: TUM Mehrwasser Wettbewerb 2016)

## Preamble

The 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016) is organized by the Chair of Thermodynamics at the Technical University of Munich (TUM). The organization team comprises a group of actively committed students under the supervision of Dr.-Ing. Markus Spinnler.

The 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016) is an international competition for upper-secondary schools (national) and universities (national and international), with the goal of developing cost-effective and energy-autonomous small-scale desalination plants. The duration of the competition is two days. The plants will be set up, presented and judged in six categories on 17.06.2016 at the Garching campus of TUM. The 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016) views itself as a modern hexathlon for sustainable water treatment.

After a detailed evaluation of the application documents by an independent jury, the team «Team», represented by «team leader\_surname»«team leader\_last name» is invited to participate in the 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016).

To ensure that the competition is carried out in a legally-binding manner, the TUM organizer and «Team» agree to the following:

### § 1 Purpose of the agreement and goal of the project

- (1) The purpose of this agreement is to facilitate participation in the 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016).
- (2) The goal of the participation is the demonstration of a fully functional water desalination plant – described as «plant» hereinafter – according to the technical guidelines described in Appendix (A). Public presentation of the plant is an essential aspect of participation in the 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016).

### § 2 Team cooperation

«Team» designates the following team leader, TUM designates the following event leader:

«Team»                      «institution»  
                                    «street\_institution»  
                                    «postal\_code\_institution» «city\_institution»

Team leader:                Mr. «team leader\_last name», «team leader\_surname»  
                                    «Street»  
                                    «Postal code», «city»  
                                    «Email»  
                                    Tel: \_\_\_\_\_

TUM: Dr.-Ing. Markus Spinnler  
Oberingenieur  
Lehrstuhl für Thermodynamik  
Boltzmannstraße 15  
85747 Garching  
Tel: 089 / 289 - 16223  
Fax: 089 / 289 - 16218  
spinnler@td.mw.tum.de  
www.mehrwasser.de

The team leaders are responsible for proper coordination of the team activities. Upper-secondary school teams must designate one of their teachers as team leader. University teams may elect a member of the staff to act as team leader.

If a team leader withdraws while this agreement is still in force, or should the team leader be forced to relinquish administration of the team for other reasons, an equally-qualified person may be nominated as a substitute only after first informing TUM, which will then subsequently inform the jury. This agreement may be terminated if the jury vetoes the nomination of the substitute team leader.

### **§ 3 Participation in the competition**

- (1) «Team» hereby agrees to the conditions for participation outlined below. «Team» furthermore agrees to the evaluation guidelines listed in Appendix (A). The jury will evaluate the individual competition entries based upon these guidelines.
- (2) The teams comprise upper-secondary school students with an average age of 15 years (teachers excluded) or students enrolled at a university. Young professionals with a maximum of five years work experience may also participate in the competition. Each team will appoint a leader. Each team can have a maximum of six members plus a team leader.
- (3) The teams will register on day one of the competition (June 17, 2016) from 8:00 am to 9:30 am and on day two of the competition (January 18, 2016) from 7:00 am to 8:30 am at the registration facility set up by TUM. All team members and team leaders must present a photo ID. Upper-secondary school students must provide a student ID card or an enrollment confirmation. Young professionals must provide a copy of their most recent graduation certificate. Team members who are not of legal age (minors) must obtain and provide written approval of participation from a legal guardian. In doing so, the legal guardian approves the terms and conditions of this agreement.

For organizational reasons, all participants must carry an ID in the form of a bracelet, pendant or badge, etc. This ID will be handed out during the registration.

- (4) «Team» hereby agrees to appear with the specified members of the team at the designated location on both days of the competition (June 17 and June 18, 2015) with a fully functioning plant.

- a) If the team leader is unable to participate for reasons that are deemed important, TUM must be informed. The team leader is responsible for appointing a representative. TUM will in turn inform the jury, which will determine if the representative will be accepted. If the team leader or representative is absent, the jury reserves the right to disqualify the team.
  - b) TUM must be informed about personnel changes to the team no later than [date]. If the change is due to illness, the notification can be submitted after the aforementioned date. TUM will inform the jury of changes to the team. The jury will then review the make up of the team to ensure it is in compliance with the rules of the competition. If a member of the team is absent on the day of the competition without a valid reason, the jury reserves the right to disqualify the team.
  - c) Should the operating principle of the plant substantially change from the one described in the application, the jury must approve the new principle. Corresponding requests are to be submitted via TUM. Such a change must be announced by [date] at the latest. If a decision is not possible in the short term for scheduling reasons, approval/denial of the new operating principle will be the responsibility of TUM
  - d) By no later than June 10, 2016, one week before the finals, «Team» must submit to TUM a five-minute video to TUM, which proves that the plant is functional. TUM will make the video available to the jury. If the team is unable to appear at the competition with a functional plant for a valid reason, TUM must be informed no later than June 10, 2016. The reason must be explained. TUM will inform the jury accordingly. If the video is not provided or if the functionality of the plant cannot be demonstrated by June 10, 2016, TUM and the jury will confer to determine if an exception to the rule can be made or to determine if the team is negligent and required to return the expense advance. The jury also reserves the right to disqualify the team.
  - e) A fully functional plant is defined as a system that TUM representatives can fill with brine water and which produces fresh water under advantageous conditions. The jury is responsible for determining the whether the plant is functional or not.
- (5) Participation in the 2016 TUM DeSal Challenge 2016 (German: TUM Mehrwasser Wettbewerb 2016) is free of charge. «Team» claims no right to participate in the competition.
  - (6) After the end of the competition, «Team» will ensure the complete removal of their plant from the grounds of the TUM campus. The space allotted to «Team» for installation of the plant will be left in its original condition.

#### **§ 4 Jury**

- (1) The jury will be appointed by TUM before the end of the application deadline. TUM will ensure the selection of a properly qualified and independent jury.

- (2) The members of the jury will be announced on the official website (whose? →Website im Deutschen nicht angegeben).
- (3) The decisions of the jury, which are binding and based on a simple majority, will be explained objectively.
- (4) No legal recourse is available to contest the decisions of the jury, which are final.

## § 5 Prize money

- (1) Each team that has been invited to and which has signed the agreement for participation in the 2016 TUM DeSal Challenge will receive an expense advance in the amount of €1,000 (one thousand) euros.
- (2) The expense advance is intended for sole purpose of building the plant for the competition.
- (3) Upon signing this agreement, the expense advance will be transferred to the following bank account:

Account holder: \_\_\_\_\_

Account number: \_\_\_\_\_

Bank code number: \_\_\_\_\_

Bank: \_\_\_\_\_

- (4) Should «Team» fail to fulfill one of the requirements outlined in § 3, (4 a) – (4 e), and if the jury decides this has led to negligence or failure to comply with the terms of the competition on the part of «Team», the expense advance must be refunded. A team is deemed negligent if it does not appear at the competition with a functional plant due to time constraints, wantonness, a lack of effort or any other invalid reason(s).

A functional plant is defined in §3, part 4 c).

- (5) If the expense advance has not fully been disbursed at the end of the 2016 TUM DeSal Challenge (German: TUM Mehrwasser Wettbewerb 2016) in adherence with the terms of the competition, «Team» may use the remaining money for any purpose.

## **§ 6 Publications**

- (1) Each team can publish the results of their work.
- (2) «Team» acknowledges TUM's obligation to publish the nature, subject and results of research works and events within its sphere of responsibility.
- (3) TUM is authorized to publish the following data in all known media as well as at scientific symposia and conferences:
  - a) The names of the participating teams, the team members, team leaders and their origin, as well as the nature and method of construction of the respective plants.
  - b) The rankings of the individual plants during the competition, as well as information and images related to the course of the competition.
- (4) TUM is authorized to publish the names and origins of the teams as well as a detailed ranking of the plant technology at scientific symposia and conferences, as well as in scientific journals.
- (5) Information related to the participating teams, their team members and team leaders, which has been stored for the purposes of the competition, will be used solely for the purposes of conducting the competition and creating the scientific rankings. Sharing this information with third parties is restricted to the extent outlined in §6 part 5 of this agreement. The State of Bavaria Data Privacy Act (Bayerisches Datenschutzgesetz) will be adhered to when handling this information.

Publications containing research results beyond those described in §6 (2) – (3), or which are subject to the general data privacy provisions of another team, must be approved by the affected team in advance. The other team will not withhold its approval without good cause. Good cause exists when information that is to be published is considered prejudicial to novelty. In this case the parties will develop a mutually agreeable solution in writing.

- (6) «Team» is obligated to adhere to the Bavarian Data Privacy Act (Bayerisches Datenschutzgesetz) with respect to its own publications. «Team» furthermore acknowledges TUM as the organizer of the competition.
- (7) The official name of the competition is: TUM DeSal Challenge 2016 (German: TUM Mehrwasser Wettbewerb 2016).
- (8) The language of the competition is German.
- (9) The official website of the competition is: [www.desalchallenge.com](http://www.desalchallenge.com)

## **§ 7 Protection of minors**

- (1) Minors (under 18 years of age) must obtain written permission from a parent or guardian in order to participate in the competition. The team leaders are

responsible for ensuring that this written permission is submitted during the registration process on the day of the competition. If the written permission of any or all minors who are members of the team is not submitted, individual team members or the entire team may be excluded from the competition.

- (2) Participating minors are protected under the applicable laws of the Federal Republic of Germany. To ensure adherence to these laws, as organizer of the event TUM reserves the right to require participating minors to wear a special form of identification, such as colored badge or bracelet, during the competition (see §3 (3)).
- (3) Minors will not be served alcoholic beverages, beer included, during the official program. Team leaders are obligated to ensure that all laws for protecting minors are adhered to.

## **§ 8 Work results and trade mark rights**

- (1) The original creator retains the copyright to the plant and the written presentation. «Team» will remain the owner of any inventions resulting from the cooperation, in addition to any subsequent copyrights that are registered or issued, as well as the know-how developed by the team prior to the beginning of the cooperation.
- (2) «Team» declares that the designed plant and the submitted files were created independently. «Team» furthermore declares that it owns all rights to the plant and files and that all portions of the work are free of third party rights. The members of «Team» indemnify TUM against third party claims with respect to these rights. All sources, institutions and persons involved in the work must be named. The citation requirement must be adhered to with respect to the written files.
- (3) The work results are defined as any results achieved through the cooperation between TUM and «Team», including all corresponding reports and files. This includes but is not limited to know-how, inventions, results protected by copyright, software and other developments, simulation models, technology developments and constructions.
- (4) If the work results contain inventions eligible for patent or utility model protection that can be traced back exclusively to TUM employees, TUM may register and realize the inventions at its own expense under its own name.
- (5) If the working results contain inventions eligible for patent or utility model protection that can be traced back to TUM employees and members of the specific team, both parties will register for the patent or utility model protection unless one party relinquishes its right in written form. The parties will promptly agree on how to share the trade mark rights and associated costs. The same applies to subsequent trade mark registrations.
- (6) If one party relinquishes its trade mark rights, the other party is entitled to apply for the trade mark rights under its own name and at its own expense. However,

the relinquishing party retains the right to use the invention free of charge for an unlimited period of time.

- (7) Each party has a simple, free of charge and unlimited right to utilize the collective trade mark for its own purposes. Each party is responsible for employee invention remuneration as prescribed by law.
- (8) The granting of licenses to such trade mark rights is only allowed with the permission of the other party under appropriate, customary conditions. In individual cases the parties will agree to resolve the matter. The approval of the other party may not be denied without cause. If approval is denied, the other party assumes the costs of the pending trade mark rights, as far as these have not yet been otherwise covered through other means.
- (9) If TUM elects not to participate in the costs for applying for trade mark rights, «Team» is entitled to register and monitor those rights in the name of both parties without conferring with TUM. «Team» will inform TUM regarding the submitted or intended applications for trade mark rights and their function in written form.
- (10) If licenses are granted for trade mark rights in which TUM did not share in the costs, «Team» is entitled to offset the corresponding licensing revenues for TUM with an allocated share of the existing and future costs for the trade mark rights.
- (11) Notwithstanding the foregoing regulation, TUM and its employees retain a non-exclusive, indefinite right to use the results and trade mark rights under an obligation to maintain confidentiality. Written non-disclosure agreements will be created as required.
- (12) All equipment and components purchased for the development and construction of the plants in preparation for the competition will remain the property of «Team», including after the conclusion of the competition.

## **§ 9 Liability**

- (1) For the safety of their team and third parties, team leaders will ensure that the plants are built in accordance with current DIN-ISO safety rules. In particular this involves:
  - a) Protection against plant failure due to high pressure (pressure control valve)
  - b) Protection against scalding of bystanders by implementing sufficient overpressure protection, as well as by ensuring secure drainage of vaporous or liquid substances with temperatures in excess of 50°C.
  - c) Protection against glare of bystanders by placing solar reflectors in suitable locations and by using tracking technologies.

- d) Protection against burning of bystanders by placing solar reflectors in suitable locations and by using tracking technologies.
- (2) TUM will not be held liable for operational accidents that occur during preparations for the competition and which do not occur on TUM property.
- (3) If TUM and the jury identify severe safety deficiencies during the competition, TUM and the jury reserve the right to take any measures required to ensure safety, or in extreme cases, shut down the plant and exclude the team from the competition.

This point is not connected to reimbursement of the expense advance.

- (4) For comprehensive protection against third party demands in case of damage, the following is agreed to:
  - a) In case of upper-secondary school teams with members who are minors, if possible the team leaders should declare the competition a school-related event. If this is not possible, the team leaders and team members must ensure that the team has adequate accident and/or health insurance coverage.
  - b) All team members must have adequate accident and/or health insurance, as well as private liability insurance with sufficient coverage in case of damage to property and persons.
- (5) TUM assumes no liability in case of damage by force majeure or malice by third parties. Constructing and operating the plant in the spaces provided by TUM is at the team's own risk. The plants must be built to ensure that they are properly secured overnight and protected against the weather.

## **§ 10 Winning prizes**

- (1) A total of 3,000 € (three thousand euros) in prize money will be distributed. The jury will select the winners on the day of the competition by taking into account the score and individual ratings of the teams.
- (2) The teams have no right or claim to the prize money.

Prize money will be awarded to the first, second and third place winners. An additional bonus may be awarded based on the structure of the 2016 applications.

## **§11 Costs for travelling and transport**

Travel, transport, construction and removal expenses are the sole responsibility of the teams.

## § 12 General provisions

- (1) This agreement comes into force when signed by both parties and terminates with the conclusion of the TUM DeSal Challenge 2016 on [date] at [time] o'clock.
- (2) The provisions outlined in §§ 5 (Publications) and 7 (Results of work and property rights) are valid for an unlimited period of time.

## § 13 Written form clause

A written form is required for any amendments or additions to this agreement as well as any collateral agreements.

## § 14 Safeguard clause

Should individual clauses of this agreement be or become invalid, the parties to the agreement shall undertake to replace the invalid clause with one they would have chosen if they had been aware of the reason for such invalidity on signing the agreement. The same applies in the event of any omissions.

## § 15 Applicable law/ place of jurisdiction

- (1) This agreement is subject to the laws of the Federal Republic of Germany. The place of jurisdiction for all disputes that may arise in connection with the competition is Munich.
- (2) Redress through the courts is excluded.

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place, date

«tl\_last name», «tl\_surname»

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place, date

[TUM]

## Appendix A:

### Evaluation criteria for the TUM DeSal Challenge 2016

The teams will construct their water desalination plants as described in their individual applications for the competition. Construction of the plants will take place during the scheduled two-day TUM DeSal Challenge competition.

The teams will compete against each other in six categories, each of which is weighted differently for the overall ranking. The maximum achievable test score is **1,000 points**. The winner of the individual categories must have at least 1.5 points more than the runner-up.

In categories 1, 2 and 3, the points are calculated from the ranking of the single category. The ranking can be easily determined using objective criteria. Categories 4-6 have sub-categories that are evaluated individually to come up with the overall ranking for the main category. For these categories, the judges use the German school grading system of 1 (best) to 6 (worst). The school grades will then be used to calculate a final grade that is subsequently utilized to create the ranking. Refer to the calculation tool for the exact point value scale.

In case of a tie, the overall ranking will be determined by comparing the investment costs in € per m<sup>3</sup> fresh water and day [€/m<sup>3</sup>d].

The individual categories and sub-categories are:

#### 1. Potable water capacity/quality (300 points/ EC)

The primary criteria for evaluating desalination plants is how much potable water is produced per day and its salination level.

The plants will undergo a functional test on the day of the competition during which they will operate under real conditions for a specified period of time. The ranking is based on the average amount of potable water produced per hour, weighted with a factor equivalent to the average salinity level. If no potable water is produced, the team will be disqualified.

The weighting factor relating to salinity levels is calculated as follows: For salinity levels of 0-250ppm, the amount of water produced is multiplied by a factor of 1; for salinity levels of 251-500ppm, by a factor of 0.9; for salinity levels of 5001-750ppm, by a factor of 0.8; and for salinity levels of 751-1000ppm, by a factor of 0.7. Salinity levels greater than 1000 ppm result in disqualification.

For the operation of the plant, the organizer will provide brine with a salinity content of 3.8 percent (38,000 ppm), which is equal to that of the Mediterranean Sea.

## **2. Cost planning (150 points / EC)**

This category is important for plants operating in less developed regions of the world. These regions often lack the resources for building water treatment plants, which leads to the use of hygienically questionable drinking water. In order to take this aspect into account and to prevent a "battle of material" during the competition, the material costs will be limited to 2.000 € per system. The teams must submit a cost plan that includes a parts list and receipts for the purchase of the individual components. Plans markedly exceeding 2000 euros will be disqualified.

## **3. Ease-of-use, maintenance, and ease-of-installation (200 points)**

As with ease-of-installation, maintenance is an important aspect in developing countries. How does the plant have to be maintained and what equipment is needed? What level of skill is required by the operating personnel? Is the required equipment available? Are special spare parts or special tools needed? What is the share of the operating costs?

Because these plants might also be operated by young or older people, operational safety is a key factor.

Regarding ease-of-operation, the plants will be evaluated primarily according to the level of automation. In other words, how much physical effort is required to produce one liter of potable water? How much physical effort is required to produce the required energy to operate the plant? Does the plant operate with human physical strength, with fire wood that is costly to procure or with solar energy?

Ease-of-installation is a key factor particularly with plants that operate in less developed regions of the world. The judges will evaluate the estimated effort required to install and commission the plant, in particular how easy it is to install and start up and the effort needed to prepare the infrastructure for the site.

The ranking also takes into account the ease with which an unassembled plant can be transported and whether it can be easily produced in developing countries.

## **4. Degree of Innovation (150 points)**

In this category, the creativity of the teams solution will be judged. Both the use of entirely new approaches to desalination, as well as the creative combination of familiar, tested principles will be closely examined. Half of the points in this category will be awarded for the submitted proposal. The remaining 75 will be awarded on the day of competition in regard to the degree of creativity and innovativeness of the ideas implemented in the plant.

## **5. Design & Engineering (100 points)**

This category evaluates and ranks the design and elegance of the engineering solution. The rating includes an evaluation of the industrial design (aesthetic design of the plant) and production quality.

## **6. Communication of the product idea (100 points)**

The driving force behind the TUM DeSal Challenge is the desire to sensitize the general public to the global issue of access to drinking water and the importance of sustainable water treatment. For this reason, it is crucial to make the individual project ideas as accessible as possible to the average citizen. Furthermore, it is essential that the teams be able to convey the technical solution and its advantages to interested customer or investors.

With this mind, the team's public relations activities will be rated by taking into account originality, how well the activities relate to the issue of drinking water, whether the message is easy to understand and the design of the PR materials. In particular, the rating is influenced by the poster design, the use of other advertising material and the oral presentation. The application letter is also considered in this rating with 25 points.

### **Application Worth 100 Points**

It is possible to earn a total of 100 points (75 for degree of innovation and 25 for the application itself) with the application. A ranking is, thus, possible with the announcement of teams selected for the competition. The ranking will be published.

### **Exclusion criteria (EC)**

A team will be disqualified during the competition if one of the following exclusion criteria cannot be fulfilled:

Exclusion criteria are an insufficient water quality (average salinity > 1000 ppm), water output quality has not potable water quality and excessive cost (>2,000 €). If storage systems are used, identical charge levels before and after the competition must be verified. Plants must be designed so that unequivocal verification is possible and that inspection can be carried out at any time. As verification, the charge level is to be recorded throughout the entire competition final and presented to the jury at the end of the competition. Requisite measuring systems are to be integrated into the plant and requisite measuring devices provided by participating teams.

Plants may not be operated using fossil fuels (e.g. coal, gas or oil) or nuclear power. All forms of renewable energy, including water, wind, solar, geothermal, landfill gas, gas from purification plants, methane gas and biomass, are permissible. The following waste materials may also be used as energy sources: mixed municipal waste from private households, paper, paperboard, cardboard and textiles. The use of unpermissible energy sources will lead to disqualification.

Plants that can already be bought or are included in a commercial project for research and development will be excluded from the competition.